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THE PLANT DISEASE REPORTER

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Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

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The unusual growing season of 1940 in Massachusetts resulted in equally unusual behavior of plant diseases, according to O. C. Boyd, page 11.

The incidence of tobacco diseases in Kentucky in 1940 is summarized in two articles: by W. D. Valleau and Stephen Diachun for the central Kentucky Burley area, page 18, and by E. M. Johnson for western Kentucky, page 20.

E. S. McFadden reports widespread development of stem rust in the southern Great Plains, page 24.

A canker of peach nursery stock in Arkansas caused by the black rot fungus is reported by John C. Dunegan, page 25.

"Rusty spot", apparently a new disease of peach occurring in Idaho, is described by Earle C. Blodgett, page 27.

Alice J. Watson reports Botryosphaeria ribis as the cause of cankers on Cercis and Benzoin, page 29.

Additional hosts and locations for the bleeding canker disease of trees are reported by Frank L. Howard, page 31. Other brief notes include reports on potato late blight in Minnesota, by Carl J. Eide, bacterial ring rot in Rhode Island, by Frank L. Howard, tobacco diseases observed in Puerto Rico, by Harold H. Foster, and increase of molds in mealy-bug infested apple orchards in Virginia, by R. H. Hurt.

December Temperatures, page 32, and Temperature for 1940, page 33.

CHECK LIST REVISION

Freeman Weiss

CEPHALANTHUS

CEPHALANTHUS OCCIDENTALIS L., BUTTONBUSH. Growth Regions 3, 4, 5, 11, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30.

Ascochyta cephalanthi Ell. & Ev., leaf spot, La.
Botryosphaeria ribis Gross. & Dug. on dead stems. Fla.
(Cercospora cephalanthi Ell. & Kell.): Ramularia cephalanthi C. perniciosa Heald & Wolf, leaf blight. Texas.
Coniothyrium cephalanthi Ell. & Ev., leaf spot. La.
Cuscuta gronovii Willd., dodder. N. Y.
Dendrophoma cephalanthi Pk., on dead branches. N. Y.
Diatrypella cephalanthi (Schw.) Sacc., on dead branches. N. Y.
Godronia cephalanthi (Schw. ex Fr.) Dearn. & House, on bark. Ala., N. Y.
Microsphaera alni DC. ex Wint., powdery mildew. Widespread.
Phoma cephalanthi P. Henn., on dead stems. N. Y.
Phyllactinia corylea Pers. ex Karst., powdery mildew. Ind.
Phyllosticta cephalanthi Tharp, leaf spot. Texas.
Physalospora obtusa (Schw.) Cke., on dead stems. Va.
Polyporus dichrous Fr., P. gilvus Schw. ex Fr., P. radiatus Sow. ex Fr. var. cephalanthi Overh., on dead stems. Lower Mississippi Valley.
Puccinia seymouriana Arth., rust (O, I). S. New England to Fla. and Central States. II and III on Spartina spp.
Ramularia cephalanthi (Ell. & Kell.) Heald, leaf spot. Ala., Kans., La., N. Y., Wis.
Rhabdospora verruciformis (Berk. & Cke.) Sacc., on dead stems. Ala.
Septoria cephalanthi Ell. & Kell., leaf spot. Kans., Wis.
Stereum rameale Schw. ex Burt, on dead stems. Lower Mississippi Valley.
Tympanis cephalanthi Dearn. & House, on dead twigs. N. Y.
Uredo cephalanthi Arth., rust (II). Fla.

CEPHALOTAXUS

CEPHALOTAXUS spp., especially C. DRUPACEA Sieb. & Zucc., JAPANESE PLUM-YEW and C. FORTUNI Hook., CHINESE PLUM-YEW. Cult.

Phomopsis juniperovora Hahn, nursery blight.

CERATONIA

CERATONIA SILIQUA L., CAROB, ST. JOHN'S BREAD. Tree of E. Mediterranean region cult. in Fla. and S. Calif.

Botryosphaeria ribis Gross. & Dug., canker. Calif.
Heterodera marioni (Cornu) Goodey, root knot.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.
Phytophthora cactorum (Leb. & Cohn) Schroet., root rot. Calif.

CERCIDIUM

CERCIDIUM TORREYANUM (Wats.) Sarg., PALOVERDE. Small tree of Southwestern deserts. Growth Regions 10, 11.

Phoradendron californicum Nutt., mistletoe. Texas to Calif.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas to Calif.

CERCIS

CERCIS CANADENSIS L., REDBUD. Growth Regions 22, 23, 24, 25, 27, 28, 29, 30.

Botryosphaeria ? ribis Gross. & Dug., canker, dieback, Del., Md.
(Cercospora cercidicola Ell.): Mycosphaerella cercidicola.
Cercosporella chionea (Ell. & Kell.) Sacc., leaf spot. Ill., Ind., Kans.
Cytospora cercidis Ell. & Ev. (nom. nud.), on twigs. W. Va.
Diplodia cercidis Ell. & Ev., on twigs. N. Y., W. Va.
Endothia viridistroma Wehm., on twigs. Ga.
Gloeodes pomigena (Schw.) Colby, on twigs. Ind.
Gloeosporium cercidis Ell. & Ev. (nom. nud.) on leaves. W. Va.
Haplosporella cercidis Ell. & Barth., on dead branches. Kans.
Macrophoma cercis Tehon & Stout, on leaves. Ill.
Mycosphaerella cercidicola (Ell. & Kell.) Wolf (Cercospora cercidicola Ell.), leaf spot. General.
Ovularia cercidis Cam., on leaves. Mo.
Pezizella lythri (Desm.) Shear & Dodge, on twigs & branches. Va.
Phyllosticta cercidicola Ell. & Ev., leaf spot. Ind., W. Va.
P. siliquastri Sacc. & Speg., on pods. Ala.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.
Physalospora obtusa (Schw.) Cke., on dead branches. Occasional.
Polyporus adustus Willd. ex Fr., P. gilvus (Schw.) Fr., P. versicolor L. ex Fr., sapwood rot or on dead wood. Widespread.
Rosellinia medullaris (Wallr.) Ces. & De Not., Ind.
Sphaeropsis cercidis Dearn. & Barth., on dead twigs. Kans.

CERCIS CHINENSIS Bunge, CHINESE REDBUD. Cult.

Cercosporella chionea (Ell. & Kell.) Sacc., leaf spot. Ind.
Diplodia cercidis Ell. & Ev., on twigs. N. Y.
Mycosphaerella cercidicola (Ell. & Kell.) Wolf, leaf spot. Conn., Ky., Md.
Phoma cercidicola Fairm., on dead branches. N. Y.

CERCIS OCCIDENTALIS Torr., WESTERN REDBUD. Growth Regions 3, 4, 5, 9, 11, 14, 16, 17

Cuscuta exaltata Engelm., dodder. Texas.
Mycosphaerella cercidicola (Ell. & Kell.) Wolf, leaf spot. Texas.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas. Also on C. reniformis Engl.

CERCOCARPUS

CERCOCARPUS spp. C. BETULOIDES Nutt., BIRCHLEAF MOUNTAIN-MAHOGANY, Growth Regions 4, 5, 9, 11; and C. MONTANUS Raf., MOUNTAIN-MAHOGANY, Growth Regions 9, 11, 12, 13, 14, 15, 16.

Diatrype standleyi Fairm., on dead branches. N. Mex.
Dothidea cercocarpi Ell. & Ev., on leaves. Calif.
Gloeosporium cercocarpi Ell. & Ev., on leaves. Calif.
Leptosphaeria cercocarpi Syd., on leaves. Utah.
Schizostoma cercocarpi Tr. & Earle, on twigs. Colo.
Stereum hirsutum Willd. ex Fr., wood rot. Oreg.
Teichospora cercocarpi (Earle) Fairm., on dead branches. Colo., N. Mex.

CESTRUM

CESTRUM spp. Shrubs and small trees of Tropical America, cult. as ornamentals in Far South.

Asterina coriacella Speg. and A. solanicola Berk. & Curt., on leaves. P. R.
Aulographium cestri Ryan, on leaves (associated with Scolecopeltis). P. R.
Cephaleuros virescens Kze., algal spot. P. R.
Meliola cestri Tehon and M. gesneriae F. L. Stevens, black mildew. P. R.
Puccinia cestri Diet. & Henn., rust (O, III). Canal Zone, P. R. Virgin Is.

CESTRUM--Continued

Scolecopeltis cestri Toro, on leaves. P. R.
Uromyces cestri (Mont.) Lev., rust (I, III). Fla., P. R., Virgin Is.

CHAMAECYPARIS

CHAMAECYPARIS LAWSONIANA (Murr.) Parl., PORT ORFORD WHITE-CEDAR. Growth Regions 1, 2; also cult. in numerous horticultural vars.

Fomes pini (Brot. ex Fr.) Karst., butt rot, heart rot. Occasional.
Phomopsis juniperovora Hahn, nursery blight.
Phytophthora lateralis Tucker, collar & root rot. Oreg.

CHAMAECYPARIS NOOTKATENSIS (Lam.) Spach, ALASKA YELLOW-CEDAR. Growth Regions 1, 4, and 6E. Alaska; also cult. in numerous horticultural vars.

Asterina cupressina Cke., on foliage. Alaska
Fomes pini (Brot. ex Fr.) Karst., trunk rot. Alaska.
Gymnosporangium nootkatense (Trel.) Arth., rust gall (II, ?III) on leaves. Alaska, Oreg., Wash. O and I on Malus rivularis, Pyrus betulaefolia, and Sorbus spp.
Lenzites saepiaria Wulf ex Fr., wood rot. Alaska.
Venturia lanea Dearn., on bark. Wash.

CHAMAECYPARIS THYOIDES (L.) BSP., ATLANTIC WHITE-CEDAR. Growth Regions 26, 27, 28, 29, 30, 31; also cult, in numerous horticultural vars.

Aleurodiscus nivosus (Berk. & Curt.) Höhn. & Litsch., on bark of living trees. Occasional.
Asterina cupressina Cke., on foliage. N. J.
Diplodia thyoidea Cke. & Ell., on twigs. N. J.
Fomes subrosea (Weir) Overh., brown pocket heart rot. N. C.
Gymnosporangium biseptatum Ell., rust gall (III) on stems. Me. to N. J., Ala. O and I on Amelanchier canadensis and A. intermedia.
G. ellisi (Berk.) Farl., rust witches' broom (III). Me. to Fla. and Ala. O and I on Comptonia peregrina, Myrica carolinensis, and M. cerifera.
G. transformans (Ell.) Kern, rust gall (III) on leaves. Me. to N. J. O and I on Aronia arbutifolia.
Hendersonia thyoides Cke. & Ell., on leaves. N. J.
Hydnum ballouii Banker, sapwood rot. N. J.
Keithia chamaecyparissi Adams, on foliage. N. J.
Lenzites saepiaria Wulf ex Fr., wood rot. Cosmopolitan.
Lophodermium juniperinum (Fr.) DeNot., on leaves. N. J.
Nectria thujana (Rehm) Sacc., on dead foliage. N. J.

CHAMAECYPARIS--Continued

Pestalotia funerea Desm., tip blight. N. J.
Phomopsis juniperovora Hahn, nursery blight. Widespread.
Physalospora obtusa (Schw.) Cke., on dead branches. N. J.
Polyporus abietinus Dicks. ex Fr., P. pinsitus (Fr.) Cke., P. sector Ehr. ex Fr., sapwood rot. Occasional.
Trichosphaeria cupressina Rehm, on leaves. N. J.

CHAMAECYPARIS spp. ORIENTAL CYPRESSES or WHITE-CEDARS, horticulturally more commonly known as RETINOSPORA, derived from C. OBTUSA (Sieb. & Zucc.) Endl., HINOKI CYPRESS, and C. PISIFERA (Sieb & Zucc.) Endl., SAWARA CYPRESS. Widely cult. in areas of intermediate hardiness.

Pestalotia funerea Desm., tip blight. N. J.
Phomopsis juniperovora Hahn, nursery blight. Widespread.
Sun scorch, twig blight. Browning and death of foliage of these plants results chiefly from environmental injuries such as desiccation and freezing, and from feeding of red spider mites.

CHAMAEDAPHNE

CHAMAEDAPHNE CALYCULATA (L.) Moench., CASSANDRA. Evergreen shrub in Growth Regions 21, 22, 23, 24, 26, 27, 28; also cult.

Ascochyta cassandrae Pk., leaf spot. N. Y. to Wis. and Ill.
Cenangium cassandrae Pk. and C. pezizoides Pk., on leaves. N. Y.
Chrysomyxa cassandrae (Pk. & Clint.) Tranz., rust (II, III). New England to Great Lakes States; also Alaska. O and I on Picea spp.
Dendrophoma phyllogena Sacc. (?conidial stage of Venturia pulchella), on leaves, N. Y.
Discella arida Pk., on leaves. N. Y.
Dothichiza cassandrae Ell. & Ev., on dead stems. Mich.
Exobasidium vaccinii (Fckl.) Wor. (E. cassandrae Pk), leaf gall. Widespread.
Godronia cassandrae Pk. (Fusicoccum putrefaciens Shear), on dead stems. N. J., N. Y.
Hypoderma cassandrae Ell. & Ev., on stems. Mich.
Lophodermium maculare (Fr.) De Not. and L. orbiculare (Ehr.) Sacc., on leaves. N. H., N. Y.
Physalospora obtusa (Schw.) Cke., on dead stems. N. Y.
Synchytrium vaccinii Thomas, red leaf gall. N. J. Northward.
Venturia cassandrae Pk. and V. pulchella Cke. & Pk., on leaves. New England to Great Lakes States.

CHILOPSIS

CHILOPSIS LINEARIS (Cav.) Sweet, DESERT-WILLOW. Growth Regions 5, 9, 10, 11, 16, 17, 20.

Phyllosticta erysiphoides Sacc., leaf spot.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

CHIOCOCCA

CHIOCOCCA ALBA (L.) Hitch., SNOWBERRY. Shrub of Tropical America, including S. Fla.

Irenopsis chiococcae F. L. Stevens, black mildew. P. R.
Meliola psychotriae Earle, black mildew. P. R.
Phyllachora noblei Chard., on leaves. P. R.
Tripsosporium stelligerum Speg., on leaves. P. R.

CHIONANTHUS

CHIONANTHUS VIRGINICA L., FRINGETREE. Growth Regions 20, 25, 27, 28, 29, 30. Together with C. RETUSA Lindl. & Paxt., ORIENTAL FRINGETREE, cult. in zones of intermediate hardiness.

Botryosphaeria pyriospora (Ell.) Sacc. (=B. ribis?), on twigs. N. J., W. Va.
Calonectria polythalama (Berk.) Sacc., on bark. N. J., N. C.
Cercospora chionanthi Ell. & Ev., leaf spot. N. J. to N. C. and W. Va.
(Cytospora chionanthi Ell. & Ev.): Valsa chionanthi.
Daedalea confragosa Bolt. ex Fr., wood rot. Md.
Dermatea chionanthi Ell. & Ev., on branches Md., W. Va.
(Diplodia chionanthi Cke. & Ell.): Dothiorella.
Dothiorella diatrypea (Cke. & Ell.) Grove, on dead branches. N. J.
Hysterographium mori (Schw.) Rehm, on branches. Md., Va.
Phomopsis diatrypea (Sacc.) Grove, (? conidial stage of Diaporthe chionanthi Brun. = D. eres Nit.), on dead branches. N. J.
Phyllactinia corylea Pers. ex Karst., powdery mildew. Md.
Phyllosticta chionanthi Thuem., leaf spot. N. J., W. Va.
Septoria chionanthi Cke. and S. eleospora Sacc., leaf spot. S. C. Tex.
Stagonospora chionanthi Ell. & S. (nom. nud.) on dead stems. W. Va.
Valsa chionanthi Ell. & Ev. (Cytospora chionanthi Ell. & Ev.), on dead branches. W. Va.

CHRYSOBALANUS

CHRYSOBALANUS ICACO L., COCO-PLUM. Evergreen tree of Tropical America including S. Fla., occasionally cult.

Asterina schroeteri (Rehm) Theiss., on leaves. P. R.
Cephaleuros virescens Kze., algal spot. Fla.
Cercospora chrysobalani Ell. & Ev. (conidial stage of Mycosphaerella chrysobalani?), leaf spot. Fla., P. R.
Leprieurina radiata Toro, on leaves. P. R.
Mycosphaerella chrysobalani Miles, leaf spot, P. R.
Pestalotia funerea Desm., on leaves. P. R.

CHRYSOPHYLLUM

CHRYSOPHYLLUM **CAINITO** L., STAR-APPLE. Evergreen tree of Tropical America, cult, in S. Fla.; and C. OBLONGIFOLIUS Michx, DEER-PLUM, a shrub in Growth Regions 29 & 30.

Asterina chrysophylli P. Henn. and A. sydowiana Ryan, on leaves. P. R.
Botryosphaeria ribis Gross. & Dug., on branches. West Indies.
Diplodia natalensis Pole-Evans, on branches. West Indies.
Meliola lucumae F. L. Stevens and M. ocoteicola F. L. Stevens, black mildew. P. R.
Uredo amicosa Arth., rust (II). P. R.

CHRYSOTHAMNUS

CHRYSOTHAMNUS spp., RABBITBRUSH. Shrubs of Rocky Mt. and Pacific Coast States. Several spp. are potential sources of rubber.

Agyriopsis betheli (Ell. & Ev.) Sacc. & D. Sacc., on twigs. Colo.
Camarosporium rosellinoides Ell. & Ev., on dead twigs. Colo.
Cucurbitaria umbilicata Ell., on dead stems. N. Dak.
Dendryphium sphaeroides Ell. & Ev., on dead stems. Nevada.
Dothidea bigeloviae Ell. & Ev., on twigs. Mont.
Erysiphe cichoracearum DC. and E. polygoni var. sepulta Ell. & Ev., powdery mildew. Widespread.
(Macrosporium puccinioides Ell. & Anders.): Alternaria. Nev., N. Mex.
Melanomma occidentale (Ell.) Sacc., on dead stems. N.D.
Montagnella tumefaciens (Ell. & Harkn.) Berl. & Vogl. Colo., N. Mex.
Phleospora bigeloviae Ell., leaf spot. Calif.
Puccinia extensicola solidaginis (Schw.) Arth., rust (C, I). Mont. to N. Mex. and Calif. II and III on Carex spp.

CHRYSOTHAMNUS--Continued

Puccinia grindeliae Pk., rust (III). Mont. to N. Mex. & Calif.
P. stipae Arth., rust (O, I). Mont. to N. Mex. & Calif. II and III on Stipa spp. and other grasses.
Rosellinia bigeloviae Ell. & Ev. and R. ovalis (Ell.) Sacc. on dead stems. N. Mex.
Sporodesmium macrosporioides Ell. & Gall., on dead stems. Mont.
Stemphylium laxum Ell. & Ev., on stems. Colo.
Tapesia tumefaciens Ell. & Ev., on dead twigs. Colo.
Thecaphora pilulaeformis Berk. & Curt., smut (inflorescence). Ariz.

CINCHONA

CINCHONA spp. (C. CALISAYA Wedd. and C. OFFICINALIS L.) Trees & shrubs of S. America, sometimes cult. in Southern U.S. as ornamentals; source of quinine.

Cercospora cinchonae Ell. & Ev., leaf spot. La.
Heterodera marioni (Cornu) Goodey, root knot.

CINNAMOMUM

CINNAMOMUM CAMPHORA Nees & Eberm., CAMPHOR-TREE. Native of SE. Asia, cult. as ornamental in Gulf States and Calif., occasionally naturalized.

Armillaria mellea Vahl. ex Fr., mushroom root rot. Cosmopolitan.
Botryosphaeria ribis Gross. & Dug., on branches. Ala.
Cephaleuros virescens Kze., algal spot. Fla. to La., P. R.
Colletotrichum. See Glomerella cingulata.
Diplodia spp. (D. camphorae Tassi, D. natalensis Pole-Evans, D. tubericola (Ell. & Ev.) Taub.), canker & dieback. Widespread. Probably a conidial stage of Physalospora rhodina.
Gloeosporium camphorae Sacc. and G. ochraceum Patters. (=Glomerella cingulata?), canker, dieback and leaf spot. Gulf States.
Glomerella cingulata (Ston.) Spauld. & Schrenk., anthracnose. Gulf States.
Lembosia camphorae Earle, leaf spot. Fla.
Leptothyrium pomi (Mont. & Fr.) Sacc., on twigs. Fla.
Phomopsis sp., (?conidial stage of Diaporthe perniciosa March. =D. eres Nit.), on roots. Fla. and West Indies.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.
Physalospora rhodina (Berk. & Cke.) Cke., on dead branches. Miss.
Rosellinia bunodes (Berk. & Br.) Sacc., root rot. Tropical America.
Tylenchulus semipenetrans Cobb, in rootlets. Fla.

CINNAMOMUM ZEYLANICUM Nees, CINNAMON-TREE. Native of SE. Asia, sometimes cult. in southern U. S.

Cephaleuros virescens Kze., algal spot. Fla.
Colletotrichum cinnamomi Tharp, on leaves. Texas.
Glomerella cingulata (Ston.) Spauld. & Schrenk., anthracnose. Fla.

CISSUS

CISSUS spp. Evergreen climbers of southern U. S. and Tropical America, especially C. ACIDA L. and C. INCISA (Nutt.) Des Moul., MARINE-IVY; C. CAPENSIS Willd. and other spp. are cult.

Aecidium mexicanum Diet. & Holw., rust (O, I). Okla.
Cercospora viticola (Ces.) Sacc., leaf spot. La.
Cronartium wilsonianum Arth., rust (II, III). West Indies.
Endophyllum circumscriptum (Schw.) Whetz. & Olive, rust (O, III). West Indies.
Meliola merrillii Syd., black mildew. Canal Zone, P. R.
Mykosyrinx cissi (DC.) Beck, smut. Fla., West Indies.
Omphalia flavida Maubl. & Rang, leaf spot. P. R.
Phyllosticta cissicola Speg., leaf spot. P. R.

ERRATA IN CASTANEA SECTION OF REVISED CHECK LIST: Bowen S. Crandall calls attention to the fact that the root disease of chestnut and chinquapin seedlings reported in the Southern States should be recorded as caused by Phytophthora cinnamomi Rands instead of by P. cambivora (Petri) Buis. This correction in the identification of the pathogen was made in PDR Supplement 110, p. 239 but the change had not yet been made in the Survey card file, from which the record in the revised check list was made. The correction should be made at each point where P. cambivora now appears, and P. cinnamomi should be inserted under Castanea dentata as occurring in Ga., Miss., S. Car. and Tenn; it also occurs on C. alabamensis Ashe, Alabama chinquapin, in Alabama.

(Division of Mycology and Disease Survey.)

THE WEATHER AND DISEASE SITUATION IN MASSACHUSETTS IN 1940

O. C. Boyd

Weather Conditions

This year will long be remembered for its late, cool growing season, including an unusually cold, wet spring and early summer, and an almost unprecedented cool dry late summer and fall. The growing season for most farm crops was about 10 days later than normal in starting and it remained definitely backward due to low temperatures until almost mid-July. The following table indicates the total precipitation and the mean daily temperature for each month from March to October inclusive.

Summary of weather conditions, by months, for Amherst, 1940

Month	Precipitation (Inches)		Mean temperature (°F)		Dates of Infection periods
	1940	Normal	1940	Normal	
March	5.58	3.70	30.1	34.4	
April	6.37	3.35	42.1	45.7	20-22
May	5.67	3.60	57.2	57.1	2-4;16-17;21-29;31
June	2.46	3.75	64.6	65.7	9-12; 24-26
July	4.69	4.10	70.6	70.8	3-4;11-12;20-22
August	1.56	4.08	66.9	68.6	6-7
Sept.	1.53	4.26	60.1	61.7	25
Oct.	1.04	3.29	46.7	50.5	8; 30-31

March was far colder and wetter than normal, with only one day registering above 47°F. April was equally cold and wet with rainfall three inches above normal and a mean daily temperature 3.6° below normal. Ice was slow in melting, frost was abnormally late in leaving the ground, and all crops were correspondingly late in getting started.

May brought rainfall two inches in excess of normal, but its mean daily temperature was about normal. The total rainfall for March, April, and May was nearly seven inches above normal. Many apple growers found it difficult or impossible to haul spray rigs through the orchards or through parts of the orchard at the delayed dormant and pre-pink bud stages. In May, there were four distinct infection periods, (see Table) for certain diseases of fruits, vegetables, potatoes, tobacco and ornamentals.

Although the precipitation for June was considerably less than normal, there were 13 rainy days and two general infection periods. Furthermore, in regard to the temperature, the month of June proved to be an odd growing period. The first nine days were unusually warm and dry; the following ten days were about normal; and the remainder of the month was abnormally cool and wet. The mean temperature for the period of June 20-30 was only 58.7° as compared with the mean of 64.6° for the entire month.

The cool, damp period that started on June 20 extended through the first week of July. The second and third weeks of July were about normal for temperature and rainfall, and the last week was unusually hot. There were two rather general infection periods, at least for some diseases. As shown in the foregoing table, August, September, and October were abnormally cool and dry. In fact, the total deficiency in rainfall for the three months was 7.5 inches. The first killing frost of the fall season arrived on August 25, about four weeks ahead of normal. The mean daily temperature for August 20-29 was 58.1°F, and the mean for the lowest daily temperatures for the same period was 44.2°. During this unusually cool period, although rainfall was almost absent, certain diseases, including late blight of potato and tomato and scab of cucumber thrived because the nights were very damp from dews or fogs.

Hence, all in all, this was an unusually late, cool growing season throughout, marked by excessive precipitation early in the season and a great deficiency during late summer and fall. Not only were all crops late in planting, but some of them, including corn, tobacco, peppers and cucurbits became progressively later as the unusually cool season ensued. The killing frost on August 25, although distinctly spotty over the state, caused no small amount of damage to corn, tobacco and tender vegetables.

The Disease Situation

The behavior of plant diseases in general was almost as odd as the character of the weather during the growing season. In fact, the effect of the unusually dry fall of 1939, together with the abnormally cold winter weather that preceded the first persistent snow cover, is believed to be reflected in the retarded development and the scarcity of apple scab perithecia this spring. Ascospore discharges were very light during the wetting periods on May 2-4 and 16-17 when the more advanced

orchards were in early pre-pink and late pink fruit bud stages respectively. It was not uncommon to find half of the overwintered scabbed leaves, although moderately to heavily spotted, in orchard samples with only a few or no perithecia reaching maturity. The same fall and winter weather conditions, along with the unusually dry summer of 1939, are believed responsible for the light damage this spring to the strawberry crop on Cape Cod by the nematode dwarf disease.

Diseases that Were Worse than Usual: Owing to the unusually wet weather early in the growing season, the following diseases were more damaging than in most seasons: Botrytis blights of tulip and peony, anthracnose of white oak and sycamore, Guignardia leaf spot of ivy, cedar rust on crabapple and hawthornes, and the leaf rust of ash trees in the easternmost sections of the state. In fact, moderate to severe defoliation was the rule for ash trees growing near the alternate host marsh grass.

In Fruit Crops. -Scab, black rot (the leaf-spot stage), leaf infection by the common cedar-apple rust and fruit infection by the quince rust, of apple; brown rot of stone fruits, particularly of plums and peaches at harvest time; peach leaf curl, the fungus shothole diseases of plum and cherry, and pear scab; also, spur blight and Verticillium wilt of raspberry, orange rust on blackberry and dewberry, Rhizoctonia fruit rot of strawberry, and black rot and powdery mildew of grapes.

In Vegetable Crops. -Damping-off of various vegetables in hot beds and plant houses during the spring season, as well as early field-sown crops of spinach, carrots, beets and celery--that is, where seed treatment or other preventative practices were omitted. Some diseases that are usually most damaging late in the season, including celery late blight, and anthracnose and the halo-blight of beans, and the small white leaf spot (Septoria) of squash, appeared early and remained active throughout the growing season. Anthracnose and the scab disease of cucumbers and summer squash, which also prefer cool, damp weather, gained a vigorous start on some farms around mid-July, but remained more or less inactive during late July and most of August. However, the cool, damp (dews, fogs) nights of late August and of September favored moderate to heavy losses from both diseases on late crops of cucumbers. Bacterial wilt, or Stewart's disease of sweet corn, although almost absent in most sections of the state, caused varying amounts of damage in susceptible varieties in Bristol County. A few fields around mid-July showed primary infections of 5 to 10 percent, while in one planting of Golden Early Market 66 percent of the hills were primary-infected, with secondary symptoms showing on most of the remainder of the plants. Mosaic of cucurbits, on the other hand, was unusually destructive in most parts of the state, and its behavior might well be associated with the increased aphis infestation during August.

Damage to the fruit of tomato by Phytophthora late blight was greater than in any season since the notable outbreak of that disease in 1932-33. Leaf infection was not pronounced or severe anywhere, although a few of the oldest leaves of all infected plants were killed prematurely. Fruit infection, or the "blight-rot" so familiar to tomato growers in 1932-33, was much more prevalent than the leaf blight stage of the same disease. By mid-September, the disease had become well established in gardens and fields in the Connecticut Valley. By the last week of September, it was destructive to the fruit in practically every non-staked, non-trellised planting in the Valley. A few unprotected, non-trellised fields in eastern Plymouth County on September 20 showed up to 50 percent loss of fruit, while the disease was just getting started in other plantings in the same localities. In that county late blight caused little or no damage either to trellised tomatoes, whether sprayed or not, or to well protected non-trellised crops. Scattered light-to-heavy infections were present also in Middlesex, Worcester and Essex Counties during the latter half of September.

In Potatoes, Tobacco, Onions. -Late blight of potatoes was unusually pronounced during late June and early July and again following the abnormally cool weather late in August. Potato scab was worse than usual in all parts of the state, and appeared to develop mostly during the dry weather of August. Tobacco downy mildew, following the cool, wet weather of June and early July developed freely both in the beds and in the open and shaded fields. Downy mildew of onions, although really damaging in only a comparatively few fields of set onions was more prevalent than in most seasons, owing to the same weather that favored tobacco downy mildew. The high temperatures during the latter half of July, following the cool, wet weather of late June and early July, brought on the tip-burn disease or "blast" of both set and seed onions.

Diseases that Were About Normal: Fire blight of apple and pear, Baldwin spot of apple, scab of peach and bacterial leaf and fruit spot of peach and plum, and cane blight and the virus diseases of raspberries.

In Vegetable Crops. - Smut of sweet corn, early blight of celery, rust of pole beans, leaf blights of carrots, rust of asparagus, mosaic of tomatoes, and black rot of stored squash.

In Potatoes, Tobacco, Onions. - Rhizoctonia stem-rot of potato; black-leg of potato, although the disease was considerably later in the history of the crop than in most seasons; virus diseases and bacterial ring-rot of potatoes; mosaic and black root-rot of tobacco, and Fusarium bottom-rot of set onions.

Diseases that Were Lighter than Usual: Brook's spot, internal cork, and bitter rot of apple, as well as fruit infection by the apple rust; the X disease of peach; Botrytis mold rot and the nematode dwarf

disease of strawberries. The characteristic symptoms of X disease in peaches and its color symptoms in chokecherry were about 3 weeks late in making their appearance.

In Vegetable Crops. -The common form of bean bacterial blight, bacterial wilt of cucurbits, bottom rot and drop of both the spring and late crops of lettuce, and wilt and root rots of peas. Diseases that were held in check by the dry weather of August and September included early blight of tomato and potato, Septoria leaf spot of tomato, Macrosporium leaf blight of muskmelon, black rot of cabbage and cauliflower. Also, the Fusarium wilt or yellows of celery, which prefers high soil temperatures, was practically absent this year.

In Potatoes, Tobacco, Onions. -Potato early blight was very light generally, also angular leaf spot of tobacco and brown root-rot of tobacco, while wildfire and Rhizoctonia sore-shin of tobacco were not reported in the state at all; and Botrytis neck-rot of onions in storage.

Apple Scab Behavior

It has already been stated that the scab [Venturia inaequalis] ascospore supply last spring not only was unusually short, but it was relatively even later in maturing than tree development. The reason, it is presumed, was the dry weather following defoliation the preceding fall, together with the very cold winter weather that preceded the persistent snow cover. It was surprising to find that many old scabbed leaves either failed to mature any perithecia whatsoever or they produced only a very light crop of spores. Although there occurred two general, prolonged wet periods before blossom, ascospore discharges and infections were very light.

For example, the first infection period, on May 2-4, when fruit buds were in late delayed dormant to early pre-pink stages, caused only light infections, even where the pre-pink spray had not been applied. The spots appeared on the undersides of the oldest spur leaves around May 22-24 during early to mid-bloom. Another light spore discharge occurred during the rain of May 16-17 when fruit buds were pink, resulting in very light infections mostly on the upper sides of unprotected leaves on both the fruit spurs and vegetative shoots.

Following that rain and the warm period on May 19-20, scab spores in the old leaves, as well as new shoot growth, developed very rapidly. In fact, a majority of the ascospores were discharged from the overwintered leaves during the period of intermittent showers and rains on May 21-29 and during the heavy rain on May 31. This truly scab weather came during the blossom period and it was responsible for most of the difficulty that

growers encountered in the control of the disease during June and July. New scab spots from that primary infection period appeared almost continuously in unsprayed trees from June 3 to 15..

Growers whose trees emerged from the hazardous, wet bloom period with the least amount of scab were (1) Those in the later sections who applied the pink spray around May 21-22 just ahead of the long rainy period and after the warm, rapid-growing weather of May 19-20, and (2) those in earlier orchard sections who applied the pink spray around May 16-18 but who followed it with an application of wettable sulfur or sulfur dust during early to mid-bloom. This emergency blossom period application was advised at the time in the pest control spray service messages. As a result of so much leaf infection during bloom, lime-sulfur for burning out scab spots was used much more extensively in June or early July than in most past seasons. Very few growers who were fortunate in timing the pink spray or who dusted or sprayed during bloom, found it advisable to apply lime-sulfur later on. Furthermore, owing to the character of the weather when the lime-sulfur spray was applied, a great many growers reported a poor job of killing of the scab fungus in the leaf spots, when 2-100 of the liquid or 8-100 of the dry lime-sulfur without lead arsenate was employed.

Fortunately, conditions were not so favorable for fruit infections by scab as for foliage infections. In the first place, the pink spray in most orchards proved adequate to protect the slowgrowing apples during the wet blossom period, although inadequate for protecting the more rapidly developing new shoot growth. Then, as the season progresses, increasingly longer rainy periods are required for infection of the fruits than for leaf infection. The three-day wet period on June 24-26 favored scab infection of unprotected apples at least in some parts of the state. Following that, there occurred no subsequent general rainy periods of sufficient duration (36 to 48 hours in July, 48 to 72 hours in August, and 4 days or longer in September) to favor infection of the fruit. However, fruit infections did occur in certain localized sections that received intermittent or continuous wetting periods of such durations, for at harvest time McIntosh crops were observed that showed two and three ages of scab spots, the last one with spots no larger than a pin head. In general, though, damage to the apple crop from scab was comparatively light considering the amount of leaf infection that was contracted during bloom and the amount of active foliage scab that survived to the end of the season.

Spray Injury

In general, this was a favorable season for spray injury. During and following the abnormally cold, wet weather from June 20 through the first week of July, copper injury to potatoes and vegetables from the use of Bordeaux mixture and copper dusts was unusually pronounced.

Cucurbits, tomatoes, some flowering plants, and potatoes ranked in that order for decreasing amounts of injury. Lime-sulfur combined with lead arsenate caused marked injury early in the season to apple foliage in most orchards where it was used, even though reduced to the recommended 1.5-100 formula. And, the same strength of lime-sulfur caused perceptible injury when used without lead arsenate. In general, apple growers who employed the all-wettable sulfur protective program, although they may have applied lime-sulfur late in June or early in July to burn out scab spots came through the season with the least amount of spray injury, and with as good scab control as those who used lime-sulfur in one or more protective sprays early in the season.

The season appeared to be equally favorable for arsenical injury, not only to fruits but to tender vegetables and the foliage of many herbaceous and woody ornamentals as well. Severe arsenical injury was the rule in peach orchards where the zinc-lime corrective was omitted. Furthermore, varying amounts of injury was reported by growers who employed that corrective.

Examples of complete defoliation of young peach trees were observed caused by the drift of apple cover sprays onto the interplanted peach trees.

Apple fruit russeting was considerably more pronounced than in most seasons, particularly in such varieties as Delicious, Baldwin, and Rhode Island Greening. Most of that injury could be traced either to the use of lime-sulfur and lead arsenate in the pink and (or) calyx sprays, or to the ordinary summer spray formula of wettable sulfur and lead arsenate without lime in the calyx and early cover sprays. The addition of hydrated lime this year to the cover sprays, as recommended in the apple spray chart, not only greatly reduced fruit russeting but it also prevented almost completely the familiar arsenical injury to the leaves that commonly occurs later in the season in the form of burnt margins and dead bands around scab spots and other injuries.

Sulfur scald, also, was unusually severe this year on the fruit of several varieties. It developed mostly following the July applications of wettable sulfur, and could well be attributed to the combined action of a heavy deposit of sulfur, high temperatures, and direct exposure to the hot sun. Severe cases were followed by marked stunting in growth and severely "scalded" surface and cracking of the fruit on the side of the apple exposed to the sun.

Winter Injury

Ornamental trees and shrubs exhibited unusual amounts of "leaf blight" and die-back that might be attributed to the cold winter with frost unusually deep in the ground, following the abnormally dry summer

and fall of 1939. Evergreens suffered the most, particularly arborvitae, junipers, white pine, spruces, and laurel and rhododendrons. Some deciduous trees also showed similar injuries, that were assigned to the same cause, especially elms, maples, and catalpa. The injuries appeared mostly in June and July, hence during and just following and in spite of the three-month period of cool, rainy weather.

Unmulched strawberry beds likewise showed moderate to severe winter injury in most instances. Also raspberries exhibited an unusual type of injury. Instead of the usual dying-back of the canes, it took the form of gradual dying or girdling of the bases of the canes or of the entire crown. In either case, the fruiting canes dried out and died sometimes during the period between blossoming and maturity of the fruit.

(Massachusetts State College, November 30.)

BURLEY TOBACCO DISEASES IN CENTRAL KENTUCKY IN 1940.

W. D. Valleau and Stephen Diachun

Because of the cold wet season black root rot [Thielaviopsis basicola] was severe in infested soils where a susceptible variety was grown. Kentucky No. 16 Burley is now so generally grown that root rot is becoming a minor disease in Burley tobacco.

During the plant bed season a period of cool wet weather of several days duration resulted in a wide-spread outbreak of angular leafspot and local outbreaks of wildfire [Phytomonas angulata, P. tabaci]. As in Western Kentucky complete control of the diseases was obtained in the plant beds where two applications of Bordeaux mixture were given to the surface of the soil. Water soaking of leaves was observed in treated and untreated beds but injury only followed in untreated beds. It is becoming increasingly evident that the causal agent of angular leafspot, and to a less extent wildfire, is present generally in plant bed soils and causes heavy infection when the leaves become water soaked. The reason for the high degree of control obtained when Bordeaux mixture is sprinkled on the soil surface until it is blue-coated as compared with incomplete control when it is sprayed on the plants appears to be directly related to the probable soil-borne nature of the bacteria. Further evidence that Bact. angulatum is a soil organism was obtained following a protracted wet period in July. Tobacco plants were set from beds on the Station farm which showed no infection whatever throughout their growth and no infection was seen in the field until this wet period. During a heavy rain in the middle of the day, when the soil was already wet, it was found that up to seven lower leaves on numerous plants in the field

were water-soaked. Water-soaked spots varied from faint stipple spots to larger areas. The water-soaking was clearly of the internal type as the leaves on all sides of the plants were equally soaked. A few days later a heavy outbreak of angular leafspot developed on the water-soaked leaves, the pattern of the water-soaked spots and the angular leafspots corresponding exactly. This appeared to be conclusive proof that an enormous quantity of inoculum was present or had developed in the soil during the protracted wet period and had found a means of entrance to the leaves during the short period when the leaves were water-soaked and were being splashed with soil by splashing rain water. In plots where tobacco had been grown continuously for 20 or more years water-soaking occurred but angular leafspot infection was rare. Certain rotation plots showed water-soaking with no infection and others heavy infection but no evident relation was seen between previous treatment and the outbreak. This outbreak was general throughout central Kentucky and occasioned much comment by growers. There was practically no further spread. On the Station farm wildfire developed during the same wet period on three small groups of plants on separate parts of the farm.

Streak (Tractus orae, virus) appears to be increasing in importance as a tobacco disease. Occasional heavy infections were reported from north central Kentucky. A feature of the disease which was first observed in September 1923 and illustrated in Kentucky Bulletin 328, 1932, namely infection in suckers of topped plants, was prevalent this year in September following a period of rapid growth brought about by rains following a very dry August. The early summer outbreak could usually be traced to sweet clover but the late outbreak occurred so long after second-year sweet clover had died that there was little obvious relationship. However in outbreaks which have occurred in the greenhouse in field size plants the local lesions on the lower leaves could sometimes be observed weeks before the disease appeared in the growing points, indicating a very long incubation period under some conditions. It is probable, however, that other legumes are also hosts of the virus.

Mosaic [virus] resistant Burley tobaccos were tested with farmers this year. In all about 200 farmers grew one or another of eight strains of mosaic-resistant tobacco. Five of these were of the Ambalema type of resistance and three were homozygous for the N factor from N. glutinosa (Holmes 5th back cross on Burley 16). The mosaic-resistant tobaccos were all mosaic-free in all tests inspected even where inoculated. At present the Ambalema type of resistance is the more promising because undesirable factors from N. glutinosa appear in homozygous (N N) strains which are not evident in heterozygous plants. These include an abnormally light color (2 strains), blooming at half the size of Burley 16 (2 strains), and at two thirds the size (1 strain), abnormally large numbers of suckers blooming at time of primary bloom (3 strains), and extremely tough suckers from which the bark is likely to be stripped in attempting to break them out. It is possible that these objections may be overcome

with further back crossing. While the Ambalema hybrids proved to be highly resistant to mosaic and black root rot and produced good quality tobacco the type of plant is not yet entirely satisfactory, and none of the varieties tested could be recommended for general planting. In spite of this some growers are very enthusiastic about the mosaic resistant tobacco.

Scald caused by excessive wilting during hot days was very prevalent in late July and early August. Certain varieties including several commonly grown varieties of Burley and the strains of mosaic resistant tobacco (Ambalema type) proved highly susceptible. Kentucky No. 16 Burley was very free from the trouble under conditions where many other strains and varieties were injured.

Cercospora leafspot [C. nicotianae] was rare in 1940.

Black shank [Phytophthora parasitica nicotianae] was found in several small plantings of Burley tobacco within the city limits of Georgetown, Scott County, and in one field in the County. It was later found in one planting in each of Owen and Nicholas Counties. It appeared to have been present in Georgetown for about eight years.

(Kentucky Agricultural Experiment Station.)

TOBACCO DISEASES IN WESTERN KENTUCKY IN 1940

E. M. Johnson

This survey includes observations on 83 fields of Burley, 101 fields of one-sucker and 88 fields of dark-fire-cured tobaccos in 8 Counties.

During a cool rainy period, soon after setting, wildfire caused marked damage in many tobacco fields. Many plants in fields set from wildfire-affected beds developed numerous halo spots and marked toxic chlorosis of the growing points. These badly diseased plants often died so that much resetting was necessary. One field of 11 acres was damaged so badly that the grower disked the plants under and reset the crop. In late spring and most of the summer rains were infrequent and both wildfire and angular leafspot were difficult to find even in fields that had high percentages of infection soon after setting. Local rains occurred in late summer and new wildfire and angular leafspot infections developed in fields that showed infections earlier. Despite the dry season wildfire was found in 16 fields of dark-fire-cured, in 33 fields of one-sucker and in 23 fields of Burley tobaccos. The loss from the bacterial leaf spots was less than in previous years but at least 10 growers of one-sucker and dark-fire-cured tobacco, who set their crop from beds affected with either wildfire or angular leafspot, had losses of 10 to 50 percent. These

growers became alarmed and cut the tobacco before it was mature. Five Burley fields were seen where wildfire caused losses of 10 to 25 percent. No losses from bacterial leafspots occurred in fields set from beds receiving Bordeaux according to directions.

Tobacco mosaic as in previous seasons caused great damage to all types of tobacco. It is believed that in most years mosaic causes greater losses to dark tobacco than do the bacterial leafspots. A high percentage of mosaic-affected plants developed severe burn which caused damage to all types of tobacco. Mosaic burn occurs on rapidly expanding leaves often a few days after a rainfall following a dry period. The bacterial leafspots occur in destructive form under similar conditions, so that many growers confuse mosaic burn with late season bacterial trouble, become alarmed, and cut the tobacco before it is mature. The number of growers who are successfully controlling mosaic by avoiding the use of barn-cured tobacco during handling operations is gradually increasing. The importance of mosaic is given in table 1.

Table 1. Amount of Mosaic observed in tobacco fields in Western Kentucky, 1940.

Percentage of plants with mosaic	Number of fields affected		
	Dark-fire-cured	One-sucker	Burley
0 - 1	13	8	6
2 - 10	9	4	3
11- 25	17	16	2
26- 40	3	8	2
41- 55	5	4	3
56- 70	3	2	2
71- 100	2	7	1

Cool temperatures for several weeks following setting were conducive to injury from black root rot [Thelaviopsis basicola]. Despite higher temperatures in midseason affected plants, in a few fields, grew slowly and in some of these fields many plants were only half grown at cutting time. In most fields, however, affected plants made fair growth after midseason but never attained normal size. Burley 16 grew normally in fields known to be infested with black root rot and in rows adjacent to dark varieties badly dwarfed with black root rot. Barnett's and Judy's Pride Burley, in several instances, were badly injured by black root rot. In a few fields of dark-fire-cured and one-sucker tobaccos the black root rot fungus advanced up the stem, produced abundant chlamydospores, and

killed the plants. Thielaviopsis was also found fruiting abundantly in wounds caused by the tobacco web worm. Black root rot was observed in 37 dark-fire-cured, 56 one-sucker and 20 Burley tobacco fields, or in 41 percent of the fields observed.

Potash hunger was observed in two dark-fire-cured, in 21 one-sucker and in 6 Burley tobacco fields. Tests of soil where potash hunger was present gave no color reaction for soluble potash by the usual method used for determining soluble potassium. One-sucker tobacco appears to be either more sensitive to a deficiency of soluble potash or the symptoms are more striking. As in previous years potash hunger was more prevalent in one-sucker tobacco than in other types. Five one-sucker fields showed damage as great as 25 percent and one field was so badly damaged that it was not worth cutting. In cases where severe rim fire occurs growers often confuse this symptom with black fire, become alarmed and cut unripe tobacco. It is not unusual for potash hunger to appear only in areas of fields next to limestone roads. In most instances areas next to limestone roads had reactions near or above neutrality whereas areas some distance from the roads where potash hunger was absent were acid.

A few plants affected with fusarium wilt [F. oxysporum nicotianae] were seen in each of 10 fields of Burley tobacco. The disease is of no economic importance in the eastern dark-fire-cured tobacco area, except in sandy river bottoms.

Black Shank [Phytophthora nicotianae] appeared on two farms near Adairville in Logan County where it was present last year. Forty-three affected plants occurred on one farm and 286 on the other. In both instances affected fields received drainage from fields where the disease was present in previous years. No affected plants were seen except in areas subject to overflow. Black shank was also found in a small door-yard planting about a mile from the above fields. The grower in this instance worked on a farm where black shank has been present for two years.

Frenching (Physiological) was observed in 5 one-sucker, 2 dark-fire-cured and 4 Burley tobacco fields. Soil samples collected from each of the above fields had the following soil reactions, determined electrometrically:

pH 7.10, 6.18, 7.21, 6.27, 6.91, 6.95, 7.15, 6.61, 6.43, 6.81 and 6.69.

For this area these soil reactions are those of limed soils. In most instances limestone had been applied recently. The other fields had received limestone from nearby limestone roads either by wind or drainage.

Table 2. Relation of tobacco streak infection to proximity of sweet clover and type of tobacco.

Location (Row 1 nearest sweet clover)	Burley		Streak in dark types adjacent to sweet clover
	Streak Number Plants	Healthy Number Plants	
Farm 1 7/24/40			
Rows 1-6	318	678	One-sucker next to sweet clover, streak 8--healthy 1223. Dark-fire-cured next to sweet clover, streak 6-healthy 1653.
" 7-12	208	766	
" 13-18	141	977	
" 19-24	86	1078	
" 25-30	55	1178	
" 31-36	31	1031	
" 37-42	36	1132	
" 43-48	25	1160	
" 49-54	10	1140	
Farm 2 7/11/40			
Row 1	17	183	
" 2	15	182	
" 3	6	177	
" 4	9	173	
" 5	3	182	
" 6	8	183	
" 7	2	164	
" 8	2	186	
Farm 3 7/23/40			
Rows 1-2	146	634	Dark-fire-cured started at Row 13 appeared free of streak
" 3-4	93	900	
" 5-6	55	900	
" 7-8	23	889	
" 9-10	22	918	
" 11-12	17	998	
Farm 4 7/31/40			
Rows 1-2-3	67	303	Dark-fire-cured next to sweet clover streak 1--healthy 1000
" 10-11	40	536	
" 20-21	23	601	
" 50-51	12	634	

Streak (virus) was found in more fields and more plants per field were affected than in previous years. The disease was observed in three dark-fire-cured, in five one-sucker and in 10 Burley fields. County agents in the area had many plants affected with streak brought to their office for identification. The relation of sweet clover to streak, also the greater susceptibility of Burley as compared with the dark types, is indicated in table 2. In the table it is shown that the greatest amount of streak occurs in row 1 which is in each instance nearest sweet clover. The disease gradually decreases as the distance from sweet clover becomes greater.

Manganese toxicity as described by Bortner[1/] was observed in a field of one-sucker tobacco in Todd County. This field was recently used as a hog feeding lot and the greatest amount of injury occurred in areas where self feeders had stood. Tobacco either died or remained dwarfed and chlorotic throughout the season. Corn planted between the tobacco rows also showed marked manganese toxicity and failed to mature. This soil was very high in soluble phosphorus and potassium and had a pH of 4.75. Soil from this field was placed in pots in the greenhouse. Turkish tobacco plants set in this soil showed manganese toxicity in 4 to 5 days.

(Kentucky Agricultural Experiment Station.)

STEM RUST IS NOW MIGRATING TO THE SUNNY SOUTH TO SPEND THE WINTER MONTHS

E S. McFadden

On September 26, 1940, after three days of continuous northerly winds, spore traps exposed at College Station, Texas, recorded a fall of approximately 36,000 stem rust [*Puccinia graminis*] spores per square foot in a six-hour period between 9:00 a. m. and 3:00 p. m. This is the heaviest fall of spores I have ever recorded at College Station for any season of the year. That these spores came from a considerable distance appeared probable from the first, since they were accompanied by particles of red soil and pollen grains of Russian thistle and our local soil is not red; neither are there any Russian thistle areas within about three hundred miles of this part of Texas. Furthermore, it had been too dry since small grain harvest at all points in the State north of here for the development of either volunteer cereals or stem rust on wild hosts.

1/ Bortner, C. E. Toxicity of manganese to Turkish tobacco in acid Kentucky soils. Soil Science 39 : 15-33. 1935.

A careful survey of areas farther north has since revealed that, owing to extreme drought after small grain harvest, there was neither volunteer small grain nor any probability of rust development on wild hosts at any point south of northern Oklahoma. However, from Northcentral Oklahoma north as far as Brookings, South Dakota, and St. Paul, Minnesota, there was an abundance of volunteer small grain which carried more or less stem rust previous to the spore shower.

The greater part of the captured spores appeared to be in good condition, and an attempt to determine their viability revealed that at least 6 percent of the catch was capable of germination.

Dr. Ralph U. Cotter of St. Paul, Minnesota, and Dr. K. S. Quisenberry, of Lincoln, Nebraska, in correspondence under dates of October 1, and September 30, respectively, mentioned the presence of stem rust in their vicinities on volunteer oats in particular. Since that time Dr. K. S. Chester of Stillwater, Oklahoma, in the Plant Disease Reporter under date of October 15, specifically mentioned the presence of stem rust on both volunteer oats and on oats seeded September 15, as well as on wheat, and expressed the belief that the disease had been present for two weeks or more. Mr. P. B. Dunkle of Denton, Texas, informed me last week that stem rust had been prevalent on volunteer oats at his station for some time. At College Station, where there was no small grain above ground until about six weeks after the heavy spore shower, no rust has been observed on any of the small grains to date, but it has been too wet in the fields to make a careful survey for the past two weeks.

The widespread development of stem rust in the Southern Great Plains at this season of the year creates a serious hazard to the 1941 small grain crops, since it is known that the disease is usually capable of surviving the winters at least as far north as the south slope of the Edwards Plateau in the vicinity of San Antonio. Whether the disease has at present migrated as far south as San Antonio is not known, but if not, the spores will probably be carried into that area from Northcentral Texas by the first strong winter "northers".

(Division of Cereal Crops and Diseases, December 5.)

PHYSALOSPORA OBTUSA ON PEACH NURSERY STOCK IN ARKANSAS

John C. Dunegan

On October 22, 1940, J. S. Knox, an Arkansas State Plant Board Inspector, submitted for diagnosis from a commercial nursery in Arkansas, a number of young peach trees having a dark brown or black sunken region on the main stem at the ground line. The diseased trees which were budded

in June 1940, were readily located in the nursery rows by the pronounced red discoloration of the leaves. Very few trees (approximately 1 per 1,000) were affected and they occurred as isolated cases scattered through the nursery.

The root tissues below and the aerial portions of the stem above the canker appeared healthy, although it was observed that the red leaves dropped from the diseased trees, if they were shaken, while adjacent healthy trees growing under similar conditions retained their leaves.

When examined in the laboratory it was noted that the cankered region, extending from approximately one inch below to one or two inches above the soil line, was misshapen and smaller in diameter than the healthy portions above and below the canker. Internally the cortical tissues were brown and collapsed. Longitudinal gum pockets were present in the affected areas. In the older portion of the canker, the tissue discoloration involved the xylem as well as the outer tissues and only the pith cylinder retained its normal color. The upper and lower boundaries of the cankers were irregular in outline with finger-like projections of gumming discolored tissue projecting into the healthy tissues.

Fragments of the inner diseased tissues were removed aseptically from the upper, central, and lower portions of the canker and placed on corn meal agar in Petri dishes. In every instance pure cultures of Physalospora obtusa (Schw.) Cke. developed from these fragments.

Since all of the trees examined showed mechanical injuries in the immediate vicinity of the cankered region, it is believed that the fungus merely invaded those trees injured by other agencies. The small number of trees affected and their random distribution as isolated cases in the nursery rows lends support to this theory.

(Division of Fruit and Vegetable Crops and Diseases, U. S. Bureau of Plant Industry, and Arkansas Agricultural Experiment Station).

RUSTY SPOT OF PEACH

Earle C. Blodgett

While making a survey for peach wart (peach blister), 1/, 2/, 3/, 4/, 5/, in a 30-acre Elberta orchard near Council, Idaho, June 13, 1940, the writer and the orchard operator found the fruit on several trees affected by a peculiar rusty spotting which neither of us recognized. The foreman and the previous operator, upon questioning, insisted that they had never seen the disease before. Wart, however, had been present on the fruit of certain trees for several years.

Upon examination August 15 and again on September 3 (at picking time) it was apparent that the rusty spotting was worse; many trees being left unharvested.

In another orchard near Caldwell (about 75 miles south of Council) the rusty spotting was severe during the 1940 season and the grower, who was greatly concerned, stated that a small amount of his fruit in 1939 was affected but not so seriously. It is of interest to note that powdery mildew (species undetermined) has become increasingly important in this particular orchard and neighboring ones, but in considerable survey work, no other cases of rusty spotting were found in Idaho.

An exchange of peach specimens in August, 1940 with workers in Colorado showed what may be the same disease in that State. So far as the writer is aware, there is no published description of this disease which has tentatively been called "rusty spot" of peach. The symptoms as observed during the 1940 season are as follows: On young fruits (first observed when they were about the size of walnuts) small rusty colored spots

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1/ Blodgett, Earle C.: Some obscure peach diseases in Idaho. P.D.R. 23:216-218 (III), 1939.

2/ _____ Incidence of fruit diseases in Idaho. 1937, 1938 P.D.R. 23:238-245 (Peach, see page 245), 1939

3/ _____ Fruit diseases in Idaho, 1939. P.D.R. 24:177-182 (5, Peach, d) 1940.

4/ _____ Important fruit diseases investigated. In "Report of Progress in Solving Idaho's Farm Problems. Forty-seventh Annual Report for Year Ending December 31, 1939." Idaho Agricultural Exp. Sta. Bul. 236:49-51, 1940.

5/ Chester, K. Starr Certain obscure virus? diseases of stone fruits. P.D.R. 24:78, 1940.

appear. They look as if drops of rusty water had settled into the hairs on the surface of the peach. The discolored hairs are easily rubbed off leaving a "bald spot" which is finely russetted although it may finally become quite smooth, shiny, and purplish in color. It has not been determined whether the spots actually enlarge or whether they merely grow with the fruit. Some fruits are about one-half affected and some are diseased over the entire surface. Later examinations showed that usually when any fruit on a tree was affected, the whole tree was diseased while the tree nearby may have had fruit showing no symptoms. Near maturity of the fruit, the diseased spots often had a red, pink or bluish-purple margin which showed distinctly against the yellow under-color of the healthy flesh. Badly affected fruits were severely dwarfed, off-shape and were graded out. So far as could be determined, slightly affected fruits showed no change either in taste or flesh appearance, but when a considerable area of the surface was diseased, the flesh was hardened and of poor quality. No evidence could be found that trees bearing affected fruit showed any symptoms. The leaves and twigs and general vigor of the trees seemed in no way changed.

It is of interest to note that some trees bore warty peaches, rusty spot peaches, and fruit affected by powdery mildew. Many fruits showed both rusty spot and mildew patches. A disease similar to the X-disease was also present, but no connection between this trouble and the others was apparent.

Evidence from the later surveys showed that rusty spot became worse, and this together with other observations of affected fruits indicated that the trouble might be due to early season infection by the powdery mildew fungus. However, dozens of rusty spot fruits were examined throughout the summer and no fungus spores were found, while on typical mildew spots spores and mycelium were abundant.

Some observers have suggested that frost early in the season might be responsible but a very heavy fruit set and promiscuous scattering of healthy and affected trees seems to rule this out. Insects or mites were regarded as possible causes but no evidence was secured on this point. Possibly a fungus may be involved.

Many trees were marked, notes taken and budding work started in an attempt to determine the status of the disease from year to year and whether the factor may be transmissible. Spraying tests also are to be conducted.

The name "rusty spot" is descriptive of the early stage but it is tentative and may need to be replaced upon further investigation and better knowledge of the trouble.

(Idaho Agricultural Experiment Station, University of Idaho.)

STUDIES OF BOTRYOSPHAERIA RIBIS ON CERCIS AND BENZOIN

Alice J. Watson

In 1939 Miss Waterman reported (Plant Disease Reporter 23:65) Botryosphaeria sp. associated with cankers on Cercis canadensis from Delaware, Maryland, and the District of Columbia. Since that time further collections have been made of this fungus on the same host and the disease produced by it was studied in the field in the vicinity of Port Republic, Maryland, where it was found to be widespread and doing considerable damage. Additional specimens have been received also from Arlington County, Virginia, and from Greensboro, North Carolina.

The disease on the red bud was characterized by numerous cankers of varying size on the branches, and at times on the trunk itself. These cankers finally encircled the branches and trunk, with consequent wilting and eventual death of infected trees. The cankers usually were initiated at branch stubs and soon became much elongated, lateral development proceeding more slowly. The bark over cankered areas was distinctly roughened, depressed, and finally blackened by the development of the stromata which were pulvinate at first and finally linear. On the older cankers a definite raised callous area surrounded the blackened central portions, where for the most part the bark adhered tenaciously. Under the bark a brown discoloration of the inner bark and wood extended for several inches in all directions beyond the depressed areas.

While these studies were in progress similar cankers were found on a single plant of Benzoin aestivale, spice bush, in the Maryland area. These cankers were on a number of side branches, which wilted in characteristic fashion, although the bush itself remained alive. The cankers were small, elongated but slightly, and somewhat roughened and depressed. Diseased areas in wood and bark extended only very limited distances beyond the cankers.

On the red bud specimens, perithecia were at first partly immersed in the stromata, but later became almost entirely superficial. They were characterized by thickened walls and prominent papillate ostioles. Abundant filiform paraphyses were present and the asci were clavate to saccate with thickened apices and distinct apical pores. Ascospores were irregularly biseriate, broadly fusoid, hyaline, non-septate, 15-21 x 7-10 mu.

Pycnidial cavities were also present containing hyaline, unicellular, bluntly fusoid conidia 11-24 x 4-8 mu, borne on short, simple conidiophores. Occasional pycnidia were noted containing minute bacillar or ovoid microconidia, 2-3 x 1 mu.

The fungus on the spice bush produced only the Dothiorella or pycnidial stage, with conidia 21-28 x 5-6 mu.

Monosporial and monoconidial cultures were made of the red bud fungus as well as cultures from the discolored wood of the cankers. On potato dextrose agar colonies were characterized by abundant white cottony aerial growth which soon became olivaceous-gray to olivaceous-black over a greenish-black to brownish-black substratum. Pycnidial stromata formed in about four weeks in occasional cultures, but usually sporulation was lacking. On cornmeal medium in flasks a purplish-pink discoloration or chromogenesis appeared.

Similar cultures were made of the spice bush fungus and its reactions on potato dextrose closely paralleled those of the red bud cultures but the chromogenesis in cornmeal flasks was lacking.

These studies indicated that the same fungus was involved on the two hosts, Botryosphaeria ribis Grossenbacher and Duggar. The form on the red bud was clearly that described by Shear, Stevens and Wilcox (Jour. Agric. Res. 28:589. 1924) as B. ribis chromogena, characterized by its chromogenic reaction on cornmeal media and definite parasitic behavior. The form from Benzoin lacking these characters is referred to B. ribis achromogena Grossenbacher and Duggar, (N. Y. Agric. Exp. Sta. Bull. 18: 186. 1911).

While this work was in progress it was learned that Miss Lucia McCulloch of the Division of Fruit and Vegetable Crops and Diseases also had the fungus on Cercis under study at the U. S. Horticultural Station at Beltsville, Maryland. In particular she had carried out an inoculation experiment; her notes concerning which are as follows:

"Several Cercis seedlings were inoculated in April and May 1940 with mycelium which was inserted in small bits under the bark of a number of the larger branches. The inoculated areas were covered with moist cotton and wrapped with parafilm. Similar wounds and coverings without inserting fungus were made as checks. The cotton remained moist for several days. Inoculations were made with the Virginia and the North Carolina isolations and both produced equally good infections. Evidence of infection was observed as early as June in darkening and slight collapse of the bark, and dying of nearest lateral branches. In July most lateral branches were dead or dying. Above one inoculated area there were 11 dead laterals. Examination of this stem showed complete girdling by the fungus; the bark dark and shriveled, the cambium practically black, and all the wood brown. The discoloration, gradually becoming less, extended for several inches both up and down the stem and into the nearest lateral branches. All inoculated areas showed evidence of infection in sunken discolored areas and in some cases slightly cracked bark. When these

inoculated stems were examined the typical interior browning was found. From the advancing margin of infections isolations were made from several stems and a dark fungus similar to the original was always recovered in pure culture."

Miss McCulloch's isolates were found to be chromogenic in their reaction so it is quite evident that here again B. ribis chromogena was involved.

(Divisions of Forest Pathology and Mycology and Disease Survey.)

BRIEF NOTES ON PLANT DISEASES

ADDITIONAL HOSTS AND LOCATIONS FOR THE BLEEDING CANKER DISEASE OF TREES: Bleeding canker of hardwoods caused by Phytophthora cactorum has been found in oak (Quercus rubra, Q. agrifolia), in elm (Ulmus americana), in birch (Betula lenta), and in beech (Fagus grandifolia, F. sylvatica, var. aspleniifolia)in addition to the several species of maple previously reported infected. A horse-chestnut tree (Aesculus hippocastanum) exhibiting symptoms of the disease has yielded cultures of a Phytophthora similar to P. cactorum which is being checked at present. Limited scouting has revealed confirmed cases of bleeding canker in the several New England States, in New York (especially Long Island), New Jersey, and southern California. (Frank L. Howard, Rhode Island Agricultural Experiment Station, December 16)

LATE BLIGHT IN MINNESOTA IN 1940: Late blight [Phytophthora infestans] was fairly general in the northeastern quarter of Minnesota in 1940. The distribution was just about the same as it was in 1939, but probably caused less damage than the epidemic of last year. Weather conditions in the southern and western parts of the State usually are not favorable for late blight and the disease seldom occurs in these sections.

The first report of the disease came early in July from the vicinity of the Twin Cities where early potatoes are raised under irrigation. No epidemic developed there. Early in August blight was reported from the northern part of the State and on August 22 it was developing rapidly there in certain fields. A heavy frost occurred in many places in northern Minnesota on August 23 and this evidently stopped further development of the epidemic in these places.

Scattered reports later in the season and after digging time indicate that losses due to rot in individual fields ranged from zero to 50 percent. The variety Chippewa seemed to be more heavily infected than Burbank Russet, or Green Mountain. (Carl J. Eide, University of Minnesota, December 9.)

BACTERIAL RING ROT IN RHODE ISLAND: Bacterial ring rot [Phytomonas sepedonica] of potato has appeared in Rhode Island in a quarter-acre, non-commercial planting with a reported loss of about 25 percent of the tubers. The seed was certified Green Mountains, cut and planted by hand without chemical treatment. The high incidence of the disease is unusual and seems to be explained on the basis of inoculum on the cutting knife. (Frank L. Howard, Rhode Island Agricultural Experiment Station, December 16.)

TOBACCO SURVEY NOTES FROM PUERTO RICO: On October 28, several seed beds on Resettlement farms of the Central Service Farm were inspected In the majority of seed beds damping-off was observed. With the exception of one bed less than 10 percent of the plants were estimated to be infected.

A number of tobacco seed beds were inspected on the high plateau region of Polomas, on October 29. Damping-off was observed in the majority but again it was estimated that less than 10 percent of the plants were infected.

On December 12, a trip was made to the Caguas sub-station. Mosaic [virus] and black shank [Phytophthora parasitica nicotianae] were observed on occasional plants in the field plots. (Harold H. Foster, Tobacco Institute of Puerto Rico, Rio Piedras.)

MOLDS INCREASE IN APPLE ORCHARDS INFESTED WITH MEALY BUG: The mealy bug secretes a sweetish material which acts as a medium for the growth of blue mold, gray mold, and black molds. These molds have greatly increased in apple orchards infested with mealy bug. Apples packed and stored from mealy-bug infested orchards in Virginia show a marked increase in storage rots over apples packed from orchards free of mealy bug. Rot caused by gray mold, Botrytis sp., has shown the greatest increase. (R. H. Hurt, Virginia Agricultural Experiment Station Piedmont Fruit Research Laboratory, Charlottesville.)

DECEMBER TEMPERATURES

(From U. S. Department of Commerce Weather Bureau, Weekly Weather and Crop Bulletin for the week ending January 7.)

The first half of December had marked contrasts in temperatures between the eastern and the western half of the country. The first week was decidedly cold for the season east of the Mississippi River and abnormally warm in the west, while conditions were subsequently reversed with cold weather over the Western States and abnormally high temperatures in the East. During the last half of the month, widespread abnormal warmth prevailed, with the general range of temperature considerably above normal

everywhere; the last week was about 20° warmer than normal in some northwestern districts.

Figure 1 shows that December, as a whole, was warmer than normal in all sections, except very locally in the Northeast. Throughout the Central Valleys and the Northwest, the temperature averaged from 4° to as many as 9° above normal, while in the South, and the Pacific States plus departures generally were 3° to 5°. Geographically, the plus departures from normal were outstandingly uniform for this season of the year.

TEMPERATURES DURING 1940

(From U. S. Department of Commerce Weather Bureau, Weekly Weather and Crop Bulletin for the week ending January 7.)

Except for January, which was abnormally cold in the Eastern States, temperatures for 1940 were mostly moderate. It was the coldest January of record in most of the South and the previous low records for this month were approached in the interior of the country, but at the same time the far West was abnormally warm. Aside from January, winter temperatures were moderate, December being warmer than normal practically everywhere and February also in most sections.

The spring season (March-May) was decidedly cooler than normal from the Mississippi Valley eastward and abnormally warm over the western half of the country. The largest plus departures were in the far Northwest and the largest minus departures from the upper Mississippi Valley eastward. The summer (June-August) was slightly cooler than normal in the Northeast and most of the South, but elsewhere it was decidedly warm, especially in the Northwest and far West. Over a considerable northwestern area, the temperature for the summer averaged from 3° to as many as 6° above normal. The fall (September-November) was relatively cool in the Northeast and along the Atlantic and Gulf coasts, but elsewhere it was warmer than normal, with the greatest plus departures in the Great Plains and Missouri and upper Mississippi Valleys. The first month of the present winter was generally warm as indicated on Figure 1.

Figure 2 shows that temperatures for the entire year of 1940 averaged below normal rather generally over the eastern half of the United States and decidedly above normal over the western half. From the Ohio and lower Missouri Valleys southward the mean annual temperatures were 1° to 2° subnormal and also in a considerable northeastern area. On the other hand, from the western Great Plains westward the plus departures were mostly substantial, with the relatively warmest weather in the far Northwest, the western slope of the Rockies and the Great Basin where locally the year was as many as 4° warmer than normal.

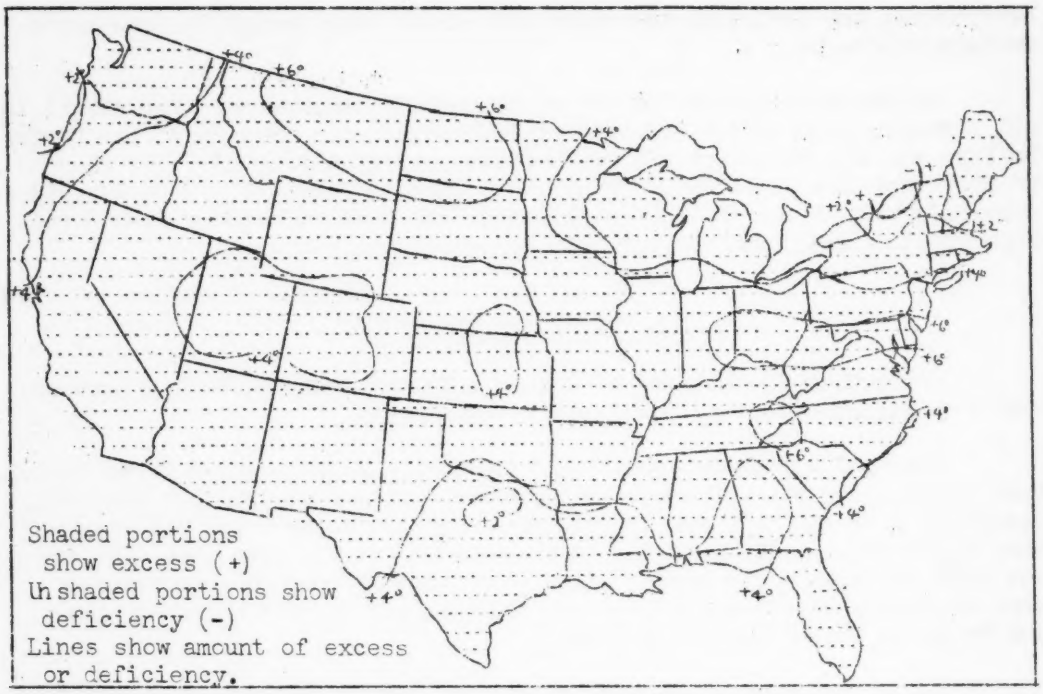

Figure 1. Departure of Mean Temperature from Normal for December 1940

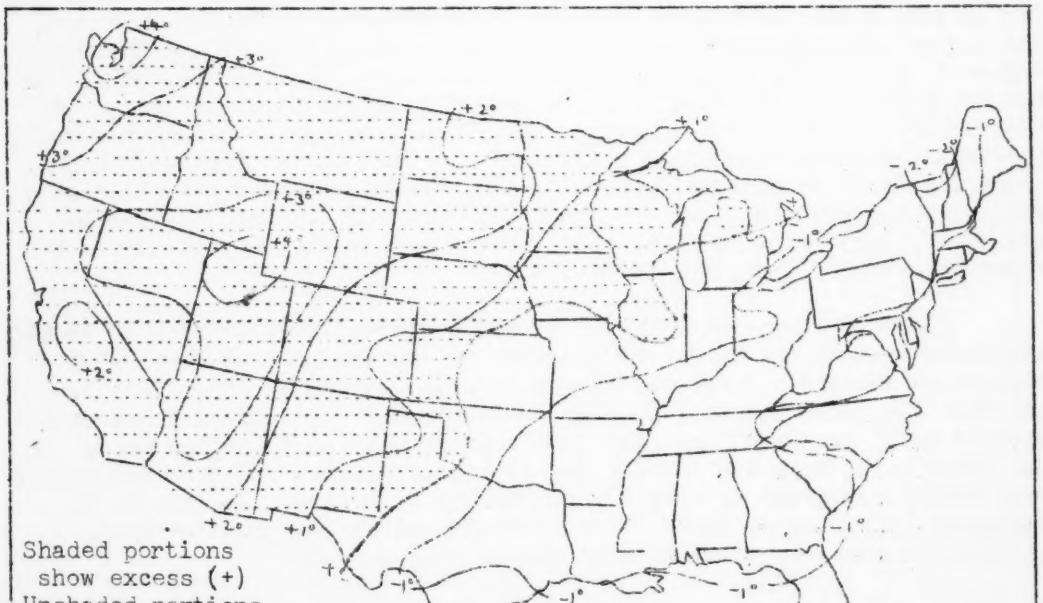

Figure 2. Departure of Mean Temperature from the Normal for the Year 1940.